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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/615,583	07/08/2003	Timothy J. Daniel	Buckfeller 15-3-3-26/0759	8978
29391	7590	09/29/2004	EXAMINER LEE, HSIEN MING	
BEUSSE BROWNLEE WOLTER MORA & MAIRE, P. A. 390 NORTH ORANGE AVENUE SUITE 2500 ORLANDO, FL 32801			ART UNIT 2823	PAPER NUMBER

DATE MAILED: 09/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/615,583

Applicant(s)

DANIEL ET AL.

Examiner

Hsien-Ming Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

HSIEN-MING LEE
PRIMARY EXAMINER

9/30/2004

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Drawings

1. Figures 3 and 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: on page 4, paragraph [0015], at line 9, "Wit" should be --With --.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1-6 and 10-13 are rejected under 35 U.S.C. 102(a) as being anticipated by applicant admitted prior art ("AAPA").

In re claim 1, AAPA, in Figs. 1-2 and related text, teaches the claimed method for depositing material on a semiconductor wafer, wherein the wafer temperature is maintained within a temperature range, the method comprising:

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- providing a target 102 comprising the material to be deposited;
- supporting the wafer 106 on a chuck 126 wherein the wafer 106 is positioned between the target 102 and the chuck 126;
- depositing material from the target 102 on the wafer 106 response to particles impinging the target 102; and
- controlling the wafer temperature within the temperature range by controlling the chuck temperature (page 4, paragraph [0015], lines 16-19).

In re claim 2, AAPA also teaches supporting the wafer 106 in a spaced apart relation from the chuck 126.

In re claim 3, AAPA also teaches that the wafer 106 is thermally coupled to the chuck 126 by radiant heat flow via heating gas (i.e. argon) (paragraph [0015]).

In re claim 4, AAPA further teaches that the wafer temperature is substantially determined by the radiant heat flow (i.e. the heating gas flow) since the wafer temperature is controlled by manipulating the heating gas flow (paragraph [0015]).

In re claim 5, AAPA also teaches that the chuck temperature substantially determines the wafer temperature (page 4, paragraph [0015], lines 16-19).

In claim 6, AAPA also teaches that the material is aluminum (paragraph [0015], line 16).

In re claim 10, AAPA teaches depositing material with a <111> crystal orientation on the wafer (paragraph [0019]).

In re claims 11 and 12, AAPA teaches depositing an underlying layer (i.e. titanium) on the wafer prior to depositing the material, wherein the underlying layer has a <002> crystal orientation (paragraph [0019]).

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In re claim 13, AAPA teaches that the material exhibits a desired grain orientation of <111> (paragraph [0019]).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 7-9 and 14-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Chen et al. (US 6,784,096).

In re claims 15 and 21, AAPA teaches the claimed physical vapor deposition chamber for depositing aluminum on a wafer, wherein the wafer temperature is maintained within a temperature range, comprising:

- a target 102 formed from the material to (i.e. aluminum) be deposited on the wafer 106;
- a chuck 126 for supporting the wafer 106; and
- an embedded chuck heater (paragraph [0015]).

AAPA does not teach including a controller for controlling the chuck heater such that the wafer temperature is within the temperature range.

Chen et al., however, in an analogous art as shown in Fig. 4 and related text, teach the claimed physical vapor deposition chamber for depositing aluminum on a wafer, wherein the wafer temperature is maintained within a temperature range, comprising:

- a target 402 formed from the material to be deposited on the wafer 408;

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- a chuck 454 for supporting the wafer 408; and
- a controller 330 for controlling the chuck temperature, which would maintain the wafer temperature within the desired temperature range (col. 13, lines 9-14).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to incorporate the controller, as taught by Chen et al. with the deposition apparatus of AAPA, since by this manner it would satisfactory manipulate the chuck temperature and thus maintain the wafer temperature within the predetermined range, which in turn would be beneficial to the film deposition.

In re claim 16, AAPA also teaches that the wafer 106 is heated by radiant heat flow via heating gas (i.e. argon) from the chuck to the wafer (paragraph [0015]).

In re claim 17, AAPA also teaches that the chuck temperature substantially determines the wafer temperature (page 4, paragraph [0015], lines 16-19).

In re claim 18, AAPA also teaches that the wafer 106 and the target 126 are disposed in a spaced-apart relation.

In re claims 19 and 14, the selection of the space between the target and the wafer is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. See M.P.E.P. 2144.05, III

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In re claim 20, AAPA also teaches that a pedestal cover 128 covers the chuck 126, wherein the pedestal cover 128 comprises a plurality of pads 127 on the upper surface of thereof, and the wafer 106 is disposed on the plurality of pads 127 (Fig.2).

In re claims 22 and 7, the selection of the deposition temperature is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. For example, the deposition temperature is dependent upon the material to be deposited.

In re claims 23-24 and 8-9, these claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and In re Aller, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious). For example, one of the ordinary skill in the art would have been motivated to use the controller of Chen et al. in the apparatus of AAPA in controlling the chuck temperature and thus to control the wafer temperature in response to a temperature measurement during the deposition.

In re claim 25, AAPA further teaches that the deposited material has a substantially <111> crystal orientation (paragraph [0019]).

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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Tuesday-Thursday (8:00 ~ 6:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hsien-Ming Lee
Primary Examiner
Art Unit 2823

Sep. 28, 2004

HSIEN-MING LEE
PRIMARY EXAMINER
Lee
9/28/2004